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Finitely generated distribution algebras ☆

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Abstract

We consider distribution algebras on rational vectors whose signatures are induced by systems of k-valued functions. For a family of algebras, we obtain a criterion for such algebras to be finitely generated. © 2002 Published by Elsevier B.V.

Keywords: Distribution algebras; k-Valued functions

One of the main problems in the structural theory of probability automata is that of generating random variables using a basic set of random generators and a set of transducers. Given a set of transducers, it is interesting to analyze the requirements on the initial generators depending on the class of random variables to be generated. In [2,3], this problem was considered for the case when transformations were made by k-valued functions. This model leads to studying algebras on random variable distributions with signatures defined by a class of transducers. In this paper, we continue the study of finitely generated distribution algebras whose signatures are induced by systems of k-valued functions, $k \geqslant 2$.

Let $T^{(k)}$, where $k \geqslant 2$, be the k-dimensional stochastic simplex, P_k be the set of all k-valued functions, $E_k = \{0, 1, 2, \ldots, k-1\}$, and $\bar{p}_i = (p_{i0}, p_{i1}, \ldots, p_{ik-1})$, where $\bar{p}_i \in T^{(k)}$, $i = 1, 2, \ldots$. For each function $f(x_1, x_2, \ldots, x_n)$ in P_k and for each $\sigma \in E_k$, we define the function

$$f^*_\sigma(\bar{p}_1, \bar{p}_2, \ldots, \bar{p}_n) = \sum \prod_{i=1}^{n} p_{i\alpha_i} f^\sigma(\alpha_1, \alpha_2, \ldots, \alpha_n), \tag{1}$$

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